

National Renewable Energy Laboratory  
Request for Proposals Number RAM-2-32246

Computational Aeroacoustic Analysis of Wind Turbines

READ THIS DOCUMENT CAREFULLY

This solicitation is being conducted under the streamlined procedures for competitive subcontracts established by the National Renewable Energy Laboratory (NREL). NREL will award a subcontract based on the following.

- All Statement of Work (SOW) requirements being met
- The best combination of:
  - Technical factors (Based on qualitative merit criteria) and
  - Evaluated price or cost

Issue Date: 10/01/02

Due Date: 11/25/02

Technical Questions must be received in writing no later than 11/01/02

1. Solicitation Type                      Streamlined Best Value Selection  
Cost Reimbursable or Cost Sharing (optional)

Submit offers to and request information from the NREL RFP contact below

2. NREL RFP Contact                      Neil Wikstrom, Subcontract Administrator  
National Renewable Energy Laboratory  
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1617 Cole Boulevard  
Golden, CO 80401-3393  
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Electronic (PDF) copies of forms, sample subcontract, and appendices can be found at:  
<http://www.nrel.gov/contracts/index.html>

3. Project description

The National Renewable Energy Laboratory (NREL) National Wind Technology Center (NWTC) has undertaken a comprehensive, multi-year research program on the subject of wind turbine aeroacoustics. The goals of this effort are to develop a thorough understanding of the mechanisms for generation, propagation, and mitigation of wind-turbine-blade acoustic emissions; to document and disseminate this information in the form of NREL reports, technical papers, seminars and colloquia; and to support the U.S. wind industry in applying rational acoustic-design principles to the development and deployment of advanced wind turbines.

Activities in fiscal year 2000-2001 included a review of previous work, outreach to potential research collaborators, and long-range planning and budgeting. A successful workshop on “Fundamentals of Aeroacoustics with Application to Wind Turbine Noise” was conducted at the NWTC in July 2001. It assembled many wind energy researchers and exposed them, through a series of invited lectures, to the current state of knowledge regarding wind turbine aeroacoustics. Participants also provided their comments and suggestions on NREL’s preliminary aeroacoustics research plan.

Several projects were initiated in fiscal year 2001-2002. Wind tunnel tests are underway that will measure the aerodynamic and aeroacoustic performance of 6 wind turbine airfoils, with emphasis on those profiles currently deployed or under development. In field tests at the NWTC, acoustic measurements of five small wind turbines were conducted and four other configurations are currently being tested. A review of quasi-empirical acoustic prediction methods was completed, and design-optimization codes are being programmed which employ the best features of this previous work. Subsequently, NREL will attempt to incorporate new methods to analyze specific noise sources. Lastly, a new initiative, which is the subject of this solicitation, is being undertaken to develop computational aeroacoustic (CAA) codes to analyze wind turbine blade noise sources as impacted by important configuration variables.

In contrast to the quasi-empirical codes that aggregate various airfoil self-noise sources (inflow turbulence, flow separation, trailing-edge bluntness, boundary-layer trailing-edge interaction, and blade-tip vortex), these CAA methods are seen as implementations of the fundamental equations of motion, supplemented by appropriate acoustic analogy. We expect they will capture the basic flow physics and resulting acoustic phenomena, thereby allowing the investigation of noise sources and potential mitigation measures. It is understood that this work is extremely complicated and computationally challenging. Nevertheless, recent progress in the application of CAA methods to propeller, helicopter and airframe noise offers encouragement that application to wind turbine noise will eventually yield useful results.

There has been some computational fluid dynamic (CFD) analysis of wind turbines, but virtually no sustained effort in CAA analysis. Therefore, it is unlikely that experienced CAA researchers also have complementary wind energy experience. Because wind turbine aerodynamics per se is quite anomalous, this lack of contemporaneous experience is a potential impediment to research progress. In recognition of this situation, NREL has formulated a two-phase approach for the project. In Phase I, those subcontractors that are selected for award will become familiar with previous research in wind turbine aeroacoustics (and relevant aerodynamics). NREL will assist by providing a comprehensive reference list and copies of documents that are out of print or difficult to procure. With the benefit of the perspective gained by reviewing this previous work, subcontractors will formulate a computational approach to a particular aeroacoustic problem. To enhance the likelihood of success, subcontractors may form teams that, collectively, have the requisite experience in CAA and wind turbine aerodynamics.

At the conclusion of Phase I, subcontractors will prepare an Interim Report and present their proposed computational approach at an Interim Project Review Meeting attended by key project participants and the NREL review team. The information provided will be used to determine if the proposed approach has sufficient merit to warrant continuation of the project. This decision will be based upon technical accomplishments and programmatic issues. Those subcontractors selected for Phase II will proceed to implement their proposed computational method and use it for selected benchmark validation studies.

It is generally believed that the most prominent wind turbine aeroacoustic noise source is the interaction of a turbulent boundary layer with the airfoil (blade) trailing edge. Some airfoils, however, are particularly susceptible to inflow turbulence and may have significant emissions from the leading edge. For this reason, care must be taken in selecting airfoil shape and other configuration variables for downwind turbines. In this case, turbine blades experience significant inflow turbulence as they fly through the tower wake. If leading and trailing edge noise is minimized, blade tip noise may become an important mechanism when trying to reduce acoustic signatures to their lowest possible levels. Researchers are uncertain of the exact mechanism for this blade tip noise. Some speculate it is the result of the interaction of the tip vortex and the trailing edge. Others believe it results from instabilities in the viscous shear layer between the vortex and free stream. With these fundamentals in mind, NREL has identified several wind turbine aeroacoustic problems of interest. Offerors may propose to work on one or more of these problems, or they may propose to work on a different problem if it addresses the specified goals and objectives of the statement of work.

Airfoil self noise – Several researchers have used experimental results to develop semi-empirical methods to predict leading and trailing edge noise. Recent studies investigated a more robust computational approach that may eventually permit the analysis of airfoils of arbitrary shape. Such a method would be useful in evaluating airfoils for use on wind turbines, perhaps obviating time consuming and expensive wind tunnel tests.

Blade tip noise – It is desirable that arbitrary blade tip shapes be modeled and their acoustic emissions estimated, at least in a relative sense. Wind turbine blades operate in extremely complex flow situations, with unsteadiness due to inflow turbulence, wind shear, pitching blades, and rotational dynamics. Although it is unlikely that the precise physical properties of this complex flow can be predicted, it may be possible to develop a simplified flow model with estimates of the resulting acoustic emissions. This would allow the detailed comparison of different shapes with the goal of selecting those that produce the lowest acoustic emissions.

Rotating blades – A more complex effort involves the modeling of the entire rotor, including twist, taper and airfoil shapes. Further refinement would involve the use of a turbulent inflow model. This approach has been used (with varying degrees of success) in CFD models to predict blade aerodynamic forces. Extending this approach to include predictions of the aeroacoustic field is an extremely challenging problem, but one that is worth attempting.

Full system model – A logical extension of the rotating blades (rotor) problem is to model the complete wind turbine, including the tower. This is particularly important for downwind turbines, where the flow field is made more complex by the shedding of coherent vortices in the tower wake. This is a recognized problem that has discouraged the development of downwind turbines, which have a reputation for broadband “tower shadow” noise as well as low-frequency impulsive noise. The value of a CAA model of this situation is in its potential use to adjust configuration variables to avoid these problems.

This RFP requires an offeror to describe its proposed project in sufficient detail to be understood and evaluated by a group of knowledgeable reviewers. Offerors must also identify their planned teaming arrangements, budget and schedule. Responses to the RFP will be evaluated by qualified business and technical professionals in accordance with section 6 of this RFP. Reference to “teaming arrangements” does not imply that only “teams” will be considered for an award. Individual researchers are also welcome to submit proposals.

#### 4. Proposed Subcontract Award and Period of Performance

To allow the broadest possible participation, subject to budget limitations, NREL anticipates that approximately 3-6 subcontracts will be awarded. Phase I, comprised of four preliminary tasks, is envisioned as a 4-6 month effort. NREL expects that 2-3 of these subcontracts will continue through Phase II, which is envisioned as a 2-3 year effort focused on code development and validation. The maximum anticipated funding for any single award is \$400,000. This does not preclude an offeror from proposing a different duration or cost if it believes that a greater level of effort will be required to achieve the project objectives. NREL intends to award cost reimbursable subcontracts, and cost sharing will not be required of participants. However, consideration will be given in the evaluation process to offerors that propose cost sharing.

#### 5. Competitive negotiated subcontract using Best Value Selection

This solicitation shall be conducted using Best Value Selection that results in an award based on the best value combination of (a) highest evaluated qualitative merit and (b) lowest evaluated price/cost of the offers submitted.

Best Value Selection is based on the premise that, if all offers are of approximately equal qualitative merit, award will be made to the offeror with the lowest evaluated price/cost. However, NREL will consider awarding to an offeror with a higher evaluated price/cost if the offer demonstrates the difference in price/cost is commensurate with the higher qualitative merit. Conversely, NREL will consider awarding to an offeror with a lower evaluated qualitative merit if the price/cost differential between it and other offers warrants doing so.

#### 6. Qualitative merit and price/cost criteria for Best Value Selection

The Statement of Work (Attachment 1) in this Request for Proposals serves as NREL’s baseline requirements that must be met by each offer.

The qualitative merit criteria establish what NREL considers the technical factors valuable in an offer. These qualitative merit criteria are performance-based and permit selection of the offer that provides higher qualitative merit for a reasonable, marginal increase in price/cost.

When combined, the qualitative merit criteria are significantly more important than price/cost. However as qualitative merit tend to equalize among offers, price/cost may become more important in the selection decision.

The following qualitative merit and price/cost criteria will be used by evaluators to judge the technical value of the offer in meeting the objectives of the solicitation.

The following criteria shall be used to evaluate proposals.

1. Technical Merit – the technical merit of the proposed computational approach as judged by the likelihood that, if correctly implemented, the project goals and objective will be achieved.
2. Technical Capability of the Offeror’s (including team members, if proposed) – the technical capability of the Offeror, including its team members, to successfully complete the Statement of Work.
3. Quality of the Project Work Plan – the likelihood of achieving the project goals and objective through implementation of the proposed work plan.
4. Cost Realism – the realism of the proposed project cost relative to the scope of work.
5. Cost Magnitude – the magnitude of the proposed cost relative to other qualified offerors.

#### Evaluation Criteria Weight

Criteria	Weight
1	30%
2	30%
3	20%
4	10%
5	10%

#### Program Policy Factors

The Source Selection Authority may consider the following program-policy factors in making a competitive range determination and final negotiation rank order. The program policy factors are not weighted.

- Compliance with NREL’s planned funding level;
- Diversity of technology within the DOE sponsored wind turbine research activities;
- Diversity of participants in the DOE wind energy program;
- A level of the Offeror’s cost sharing, if any;
- The Offeror’s ability to meet program goals and objectives identified in the Statement of Work;
- Support of U.S. economic interests – the offeror will be required to demonstrate that the proposed technology conforms with provisions of the Energy Policy Act of

1992 stating that a company shall be eligible to receive a subcontract from NREL only if :

- (1) NREL finds that the company's participation in any program under such titles would be in the economic interest of the United States, as evidenced by investments in the United States in research, development, and manufacturing (including, for example, the manufacture of major components or subassemblies in the United States); significant contributions to employment in the United States; an agreement with respect to any technology arising from assistance provided under this section to promote the manufacture within the United States of products resulting from that technology (taking into account the goals of promoting the competitiveness of United States industry), and to procure parts and materials from competitive suppliers; and
- (2) either (a) the company is a United States-owned company; or (b) NREL finds that incorporated in a country which affords to United States-owned companies opportunities, comparable to those afforded to any other company, to participate in any joint venture similar to those authorized under this Act; affords to United States-owned companies local investment opportunities comparable to those afforded to any other company; and affords adequate and effective protection for the intellectual property rights of United States-owned companies.

## 7. Evaluation process

NREL will evaluate offers in two general steps:

### Step One—Initial Evaluation

An initial evaluation will be performed to determine if all required information has been provided for an acceptable offer. Offerors may be contacted only for clarification purposes during the initial evaluation. Offerors shall be notified if their offer is determined unacceptable and the reasons for rejection will be provided. Unacceptable offers will be excluded from further consideration.

### Step Two—Discussion, Selection, Negotiation, and Award

All acceptable offers will be evaluated against the Statement of Work (Attachment 1) and the qualitative merit criteria and price/cost criteria listed above. Based on this evaluation, NREL has the option, depending on the specific circumstances of the offers received, to use one of the following methods of selection:

- (a) make selection(s), conduct negotiations, and make award(s) without discussions;
- (b) conduct parallel negotiations with all offerors and make award(s);
- (c) conduct discussions with all offerors, select successful finalists, conduct parallel negotiations with successful finalists, and then make award(s);
- (d) conduct discussions with all offerors, conduct parallel negotiations with the finalists, select successful finalist(s), and then make award(s);
- (e) select successful finalists, conduct successive negotiations, and make successive selections and awards;
- (f) make no award(s).

## 8. Proposal Preparation Instructions

One (1) unbound original and ten (10) bound copies of the Proposal should be submitted to NREL. To aid in the evaluation process, it is desired that all proposals are prepared in accordance with these instructions, be responsive to the requirements of the Statement of Work (Attachment 1), and address the Qualitative Merit and Price/Cost Criteria described above. **The technical proposal and cost proposal shall be incorporated into one complete proposal.**

Because the Technical Proposal will primarily determine the capability of the Offeror to participate in this procurement, it should be specific and complete in every detail. The Technical Proposal should be practical and should be prepared simply and economically, providing straightforward, concise delineation of capabilities necessary to satisfactorily perform the requirements being solicited.

The Technical Proposal should contain an outline of the proposed lines of investigation; method of approach to the problem; a logical division of work elements or steps necessary to meet the requirements of this solicitation; the estimated time required to complete each work element; and any other information considered pertinent to the problem or requirement. The Offeror should not merely propose to perform the work in accordance with the Statement of Work, but should outline the actual work proposed as specifically as possible.

The Technical Proposal should focus on scientific, engineering and project management issues. Information should be provided on the following topics, as a minimum

- a technical description of the proposed effort,
- the project work plan, and
- the project team.

Required work tasks are listed in the Statement of Work appended to this RFP. Offerors having the skill and experience required to complete this challenging project may also have a technical approach that deviates somewhat from the described tasks. The final Statement of Work is somewhat flexible, and offerors are encouraged to thoroughly explain any deviations from NREL's suggested work tasks.

In preparing its Technical Proposal, the Offeror should refer frequently to the following instructions and to the Qualitative Merit Criteria in item 6 above. Proposals that deviate from these requirements are likely to score lower in the evaluation process.

The Technical Proposal shall, as a minimum, contain the information listed below in accordance with the specified format (any suggested number of pages per section is meant to be guidance only). It should be no more than twenty (20) pages in length, legibly typewritten in 11-point font size on 8-1/2" x 11" paper. Pages should be arranged (and bound copies should be printed) back-to-back with odd-numbered pages on the right. Tables and figures should be referenced by number, and every page should be numbered sequentially. Relevant publications, references and

achievements may be cited, but copies should not be included. The proposal should be organized as follows:

A. Technical Proposal

Page i - Front Cover

The front cover should indicate the Name and Date of the Proposal; Name, Address and Telephone Number of the Offeror, the RFP Number and Name. An Abstract of the Proposal should also appear, along with the signatures of the Principal Investigator, Project Manager (if any) and a Business Official authorized to commit the Offeror to contractual instruments.

Page ii - Inside Front Cover

The inside front cover should be left blank.

Page iii - Table of Contents and List of Tables and Figures

If the Table of Contents and List of Tables and Figures fit on Page iii, Page iv should be left blank. Otherwise, it may be used for a continuation of those sections.

Technical Approach

This section addresses the Statement of Work requirements, the Offeror's approach toward satisfying the objectives of the Statement of Work, and the Offeror's capabilities, resources, and experience in the required project area as outlined in the following subsections.

Page 1 – Technical Description of Proposed Project

5-7 pages

NREL recognizes that by the very nature of this project, the Offeror's computational approach may not be well defined, because it may be in the early stages of formulation. Nonetheless, the Offeror must describe to the best of its ability, the important aspects of the approach and its proposed implementation. Therefore, this section of the proposal should include a definition, discussion or description of:

- the particular wind turbine aeroacoustic problem to be investigated,
- the proposed fluid dynamic approach, including simplifying assumptions,
- the proposed aeroacoustic approach, including simplifying assumptions,
- the expected results, and the means by which their accuracy will be assessed,
- the method proposed for code validation, including test data that must be provided by NREL,
- the proposed computational approach, including calculations, drawings, graphs and narrative material, as appropriate,
- the computer equipment to be used, and its suitability for the proposed approach,
- noteworthy innovations and improvements,
- those items that are essential to the success of the concept, require extensive development effort, or present extraordinary risk,



- the advantages and disadvantages of the approach and reasons for selecting it, and
- any unusual features that should be considered in assessing the ability of the concept to achieve the project goals and objectives.

#### Preliminary Work Plan

3-4 pages

This section should describe the Offeror's plans to accomplish the tasks specified in the Statement of Work, including meetings and deliverables. A successful offeror will perform the work in the most expeditious and efficient manner possible using the appropriate level of planning. In this section of the Technical Proposal, the Offeror should explain how it intends to perform the study.

NREL recognizes that any plans now envisioned are subject to evaluation and refinement. Nevertheless, the Offeror must describe to the best of its ability, the work plan it anticipates using to complete the project. In its description, the Offeror should include the project organizational structure, labor plan, and schedule along with any other items it feels are necessary to successfully complete the project. Major work tasks should be identified and briefly described by providing the following information, as a minimum:

- task/subtask number, name, objective and expected results,
- a concise description of the work to be performed,
- noteworthy issues relating to analysis, design, testing, materials or facilities, and
- required staffing, including consultants and lower-tier subcontractors.

To the extent that it can be anticipated, the following information should also be provided:

- a project organizational chart showing the Offeror's relationship to its anticipated consultants, lower-tier subcontractors, advisors and affiliates,
- a project labor plan showing the anticipated labor hours by task/subtask and labor type for both employees and consultants,
- a project schedule in bar-chart format indicating the period of performance for each activity and for the entire project, and
- milestones, reports, meetings and deliverables depicted on the project schedule.

#### Project Team

4-5 pages

This section of the Technical Proposal should provide the information needed to evaluate the capability of the Offeror, including its team members, to successfully complete its project plan. Emphasis should be placed on the specific CAA experience of the Offeror, particularly the project manager, principal investigator and activity leaders. It is understood that this information will be preliminary in nature, and that more specific teaming arrangements may develop during the project. Nevertheless, to the extent that it can be anticipated, the Offeror should provide the following information:

- a description of the Offeror's team, and its experience in CAA, wind-energy or other activities relevant to the Statement of Work,

- the name, education, description/duration of relevant experience of the anticipated project manager, principal investigator, key activity leaders and team members, and
- a description of the nature, source and availability of required facilities and equipment.

## References

This section may contain the citations of relevant publications, references and achievements of key personnel, but copies of these materials should not be included.

## B. Cost Proposal

A completed “Price/Cost Proposal Form” submitted with your offer (See Item 10-Solicitation provisions). Your price/cost proposal should include support documentation for all categories of the proposed price/cost. (See Price/Cost Proposal Preparation Instructions included with Price/Cost Proposal). A cost proposal form shall be completed for each year and/or phase of the project and for a summary of the entire project (project total).

## C. Summary of Deviations/Exceptions

A summary of deviations/exceptions to the subcontract schedule (see web site) and the standard terms and conditions and/or the intellectual property terms and conditions in the referenced appendices must be identified. The offeror will explain any exceptions (including deviations and conditional assumptions) taken with respect to this Request for Proposals. Any exceptions must contain sufficient amplification and justification to permit evaluation. Such exceptions will not, of themselves, automatically cause an offer to be termed unacceptable. A large number of exceptions or one or more significant exceptions not providing any obvious benefit to the Government or NREL may, however, result in rejection of such offer as unacceptable.

D. A completed “Representations and Certifications” form (see item 10-Solicitation provisions)

E. A completed “Small Business Subcontracting Plan” form (see item 9-f and 10-Solicitation provisions)

This solicitation does not allow the submittal of facsimile or electronic proposals.

This solicitation does not commit NREL to pay costs incurred in the preparation and submission of a proposal in response to this RFP.

## Rear Cover

The inside and outside of the rear cover should be left blank.

## 9. Solicitation Provisions—full text provided

- a. Late submissions, modifications, and withdrawals of offers  
Offers, or modifications to them, received from qualified organizations after the latest date specified for receipt may be considered if received prior to award, and NREL determines that there is a potential price/cost, technical, or other advantage, as compared to the other offers received. However, depending on the circumstances surrounding the late submission or modification, NREL may consider a late offer to be an indication of the offeror's performance capabilities, resulting in downgrading of the offer by NREL evaluators in the technical evaluation process. Offers may be withdrawn by written notice or telegram (including mailgram) received at any time before award. Offers may be withdrawn in person by an offeror or an authorized representative, if the representative's identity is made known and the representative signs a receipt for the offer before award.
- b. Restrictions on disclosure and use of data  
Offerors who include in their proposals data that they do not want disclosed to the public for any purpose or used by the government or NREL, except for evaluation purposes shall—
  1. Mark the title page with the following legend:  
"This offer includes data that shall not be disclosed outside the Government or NREL and shall not be used or disclosed—in whole or in part—for any purpose other than to evaluate this offer. If, however, a subcontract is awarded to this offeror as a result of—or in connection with—the submission of this data, the Government or NREL shall have the right to use or disclosure the data to the extent provided in the resulting subcontract. This restriction does not limit the Government's or NREL's right to use information contained in this data if obtained from another source without restriction. The data subject to this restriction are contained on pages [insert page and line numbers or other identification of pages] of this offer; and
  2. Mark each page of data it wishes to restrict with the following legend:  
"Use or disclosure of data contained on this page is subject to the restriction on the title page of this offer."
- c. Notice of right to receive patent waiver (derived from DEAR 952.227-84) and technical data requirements

Offerors (and their prospective lower-tier subcontractors) in accordance with applicable statutes and Department of Energy Acquisition Regulations, (derived from DEAR 952.227-84) have the right to request a waiver of all or any part of the rights of the United States in subject inventions in advance of or within thirty (30) days after the effective date of subcontracting,.

Small business firms, educational institutions, and domestic nonprofit organizations normally will receive the Patent Rights—Retention by the Subcontractor clause, which permits the offeror to retain title to subject inventions, except in subcontracts involving exceptional circumstances or intelligence activities. Therefore, small business firms, educational institutions, and nonprofit organizations normally need not request a waiver.

If a offeror's proposal includes a lower-tier subcontract to another organization, that lower-tier organization's business type will determine the applicable intellectual property provisions that will apply to the lower-tier subcontract. Note that a lower-tier subcontractor may apply for a patent waiver under the same conditions as the offeror.

Under a research, development, and demonstration project, DOE and NREL are unable to ascertain, prior to receipt of offers or performance of the project, their actual needs for technical data. It is believed that the requirements contained herein are the basic needs of DOE and NREL. However, if the offeror indicates in its proposal that proprietary data will be used or withheld under its proposed effort, DOE and NREL reserve the right to negotiate appropriate rights to the proprietary data. The appropriate rights may include "Limited Rights in Proprietary Data" and/or "Subcontractor Licensing."

- d. Disclaimer  
NEITHER THE UNITED STATES; NOR THE DEPARTMENT OF ENERGY; NOR MIDWEST RESEARCH INSTITUTE, NATIONAL RENEWABLE ENERGY LABORATORY DIVISION; NOR ANY OF THEIR CONTRACTORS, SUBCONTRACTORS, OR THEIR EMPLOYEES MAKES ANY WARRANTY, EXPRESS OR IMPLIED, OR ASSUMES ANY LEGAL LIABILITY OR RESPONSIBILITY FOR THE ACCURACY, COMPLETENESS, OR USEFULNESS FOR ANY PURPOSE OF ANY OF THE TECHNICAL INFORMATION OR DATA ATTACHED OR OTHERWISE PROVIDED HEREIN AS REFERENCE MATERIAL.
- e. Solicitation disputes  
The General Accounting Office and the Department of Energy no longer accept or rule on disputes from offerors for the handling of mistakes in solicitations for Requests for Proposals by Management and Operating Contractors for the Department of Energy. Should an offeror have any concerns regarding the NREL solicitation process or selection determination, the offeror may contact Marty Noland, Advocate for Commercial Practices at (303) 384-7550. NREL will address each concern received from an offeror on an individual basis.
- f. (Lower-Tier) Small Business Subcontracting Plan (derived from FAR 52.219-9)

The following requirement does not apply to small business offerors.

Proposals submitted in response to this solicitation shall include a lower-tier subcontracting plan that separately addresses lower-tier subcontracting with small business, small disadvantaged business, and women-owned small business concerns. If the offeror is submitting an individual subcontract plan, the plan must separately address lower-tier subcontracting with small business, small disadvantaged business, and women-owned small business concerns, with a separate part for the basic subcontract and separate parts for each option (if any). The plan shall be included in and made a part of the resultant subcontract. The lower-tier subcontracting plan shall be negotiated within the time specified by the NREL Subcontract Administrator. Failure to submit and negotiate a

lower-tier subcontracting plan shall make the offeror ineligible for award of a subcontract. (see item 13 – Solicitation Provisions)

10. Solicitation provisions—incorporated by reference

This solicitation incorporates one or more solicitation provisions by reference with the same force and effect as if they were given in full text. The following documents can be obtained from the NREL web site at [www.nrel.gov/contracts/index.html](http://www.nrel.gov/contracts/index.html) or the Issuer (See item 2) will make full text available upon request.

- NREL Standard Terms and Conditions:
  - Appendix B-1
- NREL Intellectual Property Provisions:
  - Appendix C-1 (Applicable if offeror is a large business, state and local government, or foreign organization)
  - OR
  - Appendix C-2 (Applicable if offeror is a domestic small business, educational institution, or other nonprofit organization)
- NREL Terms and Conditions for Subcontracts in excess of \$500,000.00
  - Appendix D-1
- NREL Representations and Certifications for Subcontracts (04/30/99)
- NREL Price/Cost Proposal Form and Instructions (10/19/00)
- NREL “Small Business Subcontracting Plan”

11. NAICS Code and Small Business Size Standard

- a. The North American industry Classification System (NAICS) code [formerly standard industrial classification (SIC)] for this solicitation is 541710.
- b. The small business size standard for 541710 is 500 or fewer employees.